

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER

1900/00021

U.S. APPLICATION NO. 10/00021, filed 09/27/2001

**09/763515**

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/JP00/04584	10 July 2000	9 July 1998 
TITLE OF INVENTION SECURITY THREAD AND MANUFACTURING METHOD THEREOF		
APPLICANT(S) FOR DO/EO/US WADA, Tetsuro, MATSUMURA, Katsumi		

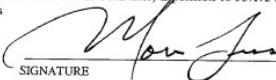
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

- This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
- This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. § 371.
- This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
- A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
- A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a.  is transmitted herewith (required only if not transmitted by the International Bureau).
  - b.  has been transmitted by the International Bureau.
  - c.  is not required, as the application was filed in the United States Receiving Office (RO/US).
- A translation of the International Application into English (35 U.S.C. 371(c)(2)).
- Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a.  are transmitted herewith (required only if not transmitted by the International Bureau).
  - b.  have been transmitted by the International Bureau.
  - c.  have not been made; however, the time limit for making such amendments has NOT expired.
  - d.  have not been made and will not be made.
- A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
- An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
- A translation of the Annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

## Items 11. to 16. below concern other document(s) or information included:

- An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
- An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
- A FIRST preliminary amendment.
- A SECOND or SUBSEQUENT preliminary amendment.
- A substitute specification.
- A change of power of attorney and/or address letter
- Other items or information:

Copy of the first page of the application as published; copy of the International Search Report

U.S. APPLICATION NO. (If known, see 37 CFR 1.45)	INTERNATIONAL APPLICATION NO PCT/JP00/04584	ATTORNEY'S DOCKET NUMBER 1900/00021																
<input checked="" type="checkbox"/> The following fees are submitted:		CALCULATIONS PTO USE ONLY																
<p><b>Basic National Fee</b> (37 CFR 1.492(a)(1)-(5));</p> <table> <tr> <td>Search Report has been prepared by the EPO or JPO.....</td> <td>\$860.00</td> </tr> <tr> <td>International preliminary examination fee paid to USPTO (37 CFR 1.482) .....</td> <td>\$690.00</td> </tr> <tr> <td>No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....</td> <td>\$760.00</td> </tr> <tr> <td>Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....</td> <td>\$1,000.00</td> </tr> </table> <p>International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4).....</p> <p style="text-align: right;"><b>\$100.00</b></p>			Search Report has been prepared by the EPO or JPO.....	\$860.00	International preliminary examination fee paid to USPTO (37 CFR 1.482) .....	\$690.00	No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....	\$760.00	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....	\$1,000.00								
Search Report has been prepared by the EPO or JPO.....	\$860.00																	
International preliminary examination fee paid to USPTO (37 CFR 1.482) .....	\$690.00																	
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....	\$760.00																	
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....	\$1,000.00																	
<b>ENTER APPROPRIATE BASIC FEE AMOUNT = \$860.00</b>																		
<p>Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).</p> <table> <tr> <td>Claim</td> <td>Number Filed</td> <td>Number Extra</td> <td>Rate</td> </tr> <tr> <td>Total Claims</td> <td>9 - 20 =</td> <td>0</td> <td>X \$18.00</td> </tr> <tr> <td>Independent Claims</td> <td>6 - 3 =</td> <td>3</td> <td>X \$80.00</td> </tr> <tr> <td>Multiple dependent claim(s)(if applicable)</td> <td></td> <td></td> <td>+ \$270.00</td> </tr> </table> <p style="text-align: right;"><b>TOTAL OF ABOVE CALCULATIONS = \$1,100.00</b></p> <p>Reduction by 1/2 for filing by small entity, if applicable.</p> <p style="text-align: right;"><b>\$0.00</b></p> <p style="text-align: center;"><b>SUBTOTAL = \$1,100.00</b></p> <p>Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).</p> <p style="text-align: center;"><b>TOTAL NATIONAL FEE = \$1,100.00</b></p> <p>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property +</p> <p style="text-align: center;"><b>TOTAL FEES ENCLOSED = \$1,140.00</b></p>			Claim	Number Filed	Number Extra	Rate	Total Claims	9 - 20 =	0	X \$18.00	Independent Claims	6 - 3 =	3	X \$80.00	Multiple dependent claim(s)(if applicable)			+ \$270.00
Claim	Number Filed	Number Extra	Rate															
Total Claims	9 - 20 =	0	X \$18.00															
Independent Claims	6 - 3 =	3	X \$80.00															
Multiple dependent claim(s)(if applicable)			+ \$270.00															
		Amount to be: refunded <b>\$</b>																
		charged <b>\$</b>																
<p>a. <input checked="" type="checkbox"/> A check in the amount of <b>\$1,140.00</b> to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. <b>22-0185</b> in the amount of <b>\$</b> _____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Director is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <b>22-0185</b>. A duplicate copy of this sheet is enclosed.</p>																		
<p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status</p> <p>SEND ALL CORRESPONDENCE TO:</p> <p><b>Connolly Bove Lodge &amp; Hutz LLP</b> 1990 M Street, N.W., Suite 800 Washington, DC 20036-3425</p> <p> 2/23/01</p> <table> <tr> <td>SIGNATURE</td> <td>Morris Liss</td> </tr> <tr> <td>NAME</td> <td></td> </tr> <tr> <td>24-510</td> <td></td> </tr> <tr> <td>REGISTRATION NUMBER</td> <td></td> </tr> </table>			SIGNATURE	Morris Liss	NAME		24-510		REGISTRATION NUMBER									
SIGNATURE	Morris Liss																	
NAME																		
24-510																		
REGISTRATION NUMBER																		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: :  
Tetsuro Wada et al. :  
Serial No.: To be assigned : Art Unit: To be assigned  
Filed: Herewith : Examiner: To be assigned  
For: SECURITY THREAD AND : Atty Docket: 1900/00021  
MANUFACTURING :  
METHOD THEREOF :  
: :  
:

PRELIMINARY AMENDMENT

Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to initial examination, please amend the above-identified national phase application as follows.

IN THE CLAIMS

Please amend claims 4 and 7, and add new claims 8 and 9 as follows:

At claim 4, line 1, replace "any one of claims 1 to 3" with --claim 3--.

7. (Amended) A manufacturing method of a security thread, comprising a step of covering peripheries of a core member comprising a soft magnetic fiber or [a core member comprising] the soft magnetic fiber and a core thread and a thermal welding thread disposed in the vicinity of said core member with a cover member comprising a nonmetal material.

--8. The security thread according to claim 2, wherein said soft magnetic fiber comprises an amorphous metal ribbon.

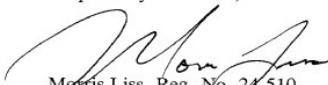
TUESDAYS 10:00-12:00 2:00-4:00

9. The security thread according to claim 3, wherein said soft magnetic fiber comprises an amorphous metal ribbon.--

**R E M A R K S**

Claims 1-9 are now pending in this application. Claim 7 has been amended to incorporate the changes made in the International Application under Article 19. Claim 4 has been amended to eliminate its multiple dependency, and new claims 8 and 9 are the recitations of claim 4 dependent from claims 2 and 3, which dependencies were eliminated in the amendment to claim 4. None of these amendments is believed to involve any new matter. Accordingly, it is respectfully requested that the foregoing amendments be entered, that the application as so amended receive an examination on the merits, and that the claims as now presented receive an early allowance.

Respectfully submitted,



Morris Liss, Reg. No. 24,510  
Connolly Bove Lodge & Hutz LLP  
1990 M Street, N.W., Suite 800  
Washington, D.C. 20036-3425  
Telephone: 202-331-7111

Date: 2/23/01

## SPECIFICATION

## SECURITY THREAD AND MANUFACTURING METHOD THEREOF

## 5 TECHNICAL FIELD

The present invention relates to a security thread and a manufacturing method thereof, particularly to a security thread for preventing a theft of illegally taking away a commodity on sale, a public facility equipment, and the like without permission and to a manufacturing method of the security thread.

10

## BACKGROUND ART

In a conventional art, for the aforementioned object, a magnetic member is disposed on a back surface of a bar code bonded to a commodity or a tag indicating a commodity price, quality, and the like to correspond to a sensing system in which magnetism is utilized, and an action of illegally taking away the commodity or the like is monitored and prevented.

15

However, the aforementioned constitution has problems that a label or a tag is easily separated from the commodity, existence of the magnetic member is easily recognized, the member is cut or destroyed and a function of a theft preventing tag cannot be fulfilled. Moreover, in some form of the commodity as an object, it is difficult to dispose a seal or a tag for security.

20

## DISCLOSURE OF THE INVENTION

25

Therefore, attention has been given to the aforementioned

09/763515-022301

conventional situations and problems to develop the present invention, and an object of the present invention is to solve the problems and to provide a security thread whose existence is not clarified, which is prevented beforehand from being removed, which can also be attached to a commodity of a form heretofore regarded as difficult and whose use purpose range is enlarged and to provide a manufacturing method of the security thread.

5

As a result of various examinations of a security product constitution in which magnetic characteristics of a soft magnetic material are applied, the present inventor et al. have found that a security thread structured by using a soft magnetic fiber provided with flexibility in a core member and covering the core member with a cover member of a nonmetal material can be used to achieve the aforementioned object, and have completed the present invention. That is to say, according to a first aspect of the present invention, there is provided a security thread constituted of a core member comprising a soft magnetic fiber, or the soft magnetic fiber and a core thread, and a cover member comprising a nonmetal material to cover the core member. Moreover, according to a second aspect of the security thread of the present invention, the core member comprising the soft magnetic fiber, or the soft magnetic fiber and core thread, and a member comprising a semi-hard magnetic material are covered with the cover member comprising the nonmetal material. According to a third aspect of the security thread of the present invention, the soft magnetic fiber or the core member comprising the soft magnetic fiber and a thermal welding thread are covered with the cover member comprising the nonmetal material. Furthermore, according to the present invention, there is also provided a manufacturing method of the aforementioned security thread.

10

15

20

25

09763515-022301

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram showing a structure of one embodiment of a security thread of the present invention;

5 Fig. 2 is a diagram showing another embodiment of the security thread of the present invention;

Fig. 3 is a diagram showing still another embodiment of the security thread of the present invention;

10 Fig. 4 is a diagram showing one example of a use state of the security thread of the present invention;

Fig. 5 is a diagram showing one example of a state in which the security thread of the present invention is used in a brand tag;

Fig. 6 is a diagram showing another example of the state in which the security thread of the present invention is used in the brand tag; and

15 Fig. 7 is a diagram showing still another embodiment of the security thread of the present invention.

#### BEST MODE FOR CARRYING OUT THE INVENTION

A preferred embodiment of a security thread of the present invention will next be described.

20 When a soft magnetic fiber used as a core member in the present invention is a fiber constituted of a metal magnetic material indicating soft magnetic properties, a crystal structure (crystal/non-crystal) or an alloy composition is not particularly limited, but a fiber of a metal material having a high permeability of 1000 or more in an excitation magnetic field of 5 mOe, 1

kHz is preferable. As the metal material of the present invention, permalloy indicating the aforementioned high permeability characteristic, Fe-Si based alloy, amorphous metal, and the like can be used, but among all an amorphous metal fiber mainly composed of Co-Fe-Si-B is particularly preferable because the permeability in the excitation magnetic field of 5 mOe, 5 1 kHz indicates a high permeability of 10000 or more.

Moreover, an amorphous metal fiber mainly composed of Fe-Co-Si-B, indicating a magnetic characteristic with a large Barkhausen discontinuity to rapidly cause magnetization reverse in a certain specific excitation magnetic 10 field value (reverse magnetic domain forming limit magnetic field value) in a magnetization process can also be a particularly preferable material as the soft magnetic fiber.

Furthermore, for a small-width amorphous metal ribbon mainly composed of Fe-Si-B, Fe-Co-Si-B or Co-Fe-Si-B, and provided with a sectional 15 structure in which a width is in a range of 0.2 mm to 1.5 mm, thickness is in a range of 0.01 mm to 0.05 mm, and a ratio of thickness to width (thickness/width) is in a range of 0.02 to 0.4, since the aforementioned unique soft magnetic characteristic is indicated, the ribbon can substantially be regarded as the soft magnetic fiber with respect to the security thread of the 20 present invention, and can be exemplified as a particularly preferable material according to the present invention.

A core thread in the present invention is used as the core member together with the aforementioned soft magnetic fiber, and a bundle filament made up of various synthetic fibers or natural fibers, twist filament, thermal 25 welding thread, polynosics, or spun rayon can be used. Moreover, for a core

09763515 - 022304

thread size, the thread is preferably thicker than the soft magnetic fiber.

Here in the security thread of the present invention, in order to unify the soft magnetic fiber and core thread with a cover member described later, and prevent the soft magnetic fiber from falling off or prevent a fingertip or a

commodity from being damaged by the soft magnetic fiber, the core thread is 5 preferably provided with a thermal welding thread. Additionally, the thermal welding thread preferably has a size of about 100 to 200 deniers and melting temperature of about 100°C.

Furthermore, in the security thread of a second aspect of the  
10 present invention, in order to deactivate the magnetic characteristic of the soft magnetic fiber, it is necessary to use a semi-hard magnetic material together with the aforementioned core member. Here, deactivation in the present invention means that the magnetic characteristic of the soft magnetic fiber is changed by magnetizing the semi-hard magnetic material. That is to say,  
15 during deactivation, the security thread containing the soft magnetic fiber is not easily sensed by a detection system. In the present invention, as the semi-hard magnetic material used to impart such deactivating function, the semi-hard magnetic material whose coercive force is in a range of 10 oersteds to 500 oersteds can be used, and various Fe alloys or Co alloys can be used.  
20 Among all an Fe-Co-V based alloy or an Fe-Co-Cr based alloy is a preferable material in the present invention because the alloy indicates a superior semi-hard magnetic characteristic in a range of 30 oersteds to 150 oersteds. Additionally, as a form of the semi-hard magnetic material in the present invention, a linear material having a circular section, elliptical section or  
25 polygonal section, or a thin plate or a thin band having a thin rectangular

section can be used. Moreover, when a semi-hard magnetic material with a length of 3 mm or more is used, the magnetized semi-hard magnetic material can preferably impart a sufficient deactivating function to the security thread.

The cover member in the present invention visually or mechanically  
5 protects the soft magnetic fiber, and various materials and constitutions can be used in accordance with a purpose for which the security thread of the present invention is utilized. Here, examples of the material used in the cover member of the present invention include a thread or a band (tape-shaped) formed of synthetic fibers such as nylon and polyester or natural fibers, and a gold thread or a silver thread constituted of various materials can also be used. In an example of the gold thread or the silver thread, aluminum is particularly  
10 preferably vacuum-deposited on one surface of a polyester film or another polymeric film, or a metallic thread formed by coloring the film in blue, red, green or another arbitrary color can also be used, and commodity distinction  
15 can also be suggested by this color.

It is necessary to cover the core member with the cover member used in the present invention, and prevent the metallic core member from being exposed. That is to say, the metallic core member can be covered with the nonmetallic cover member as if the security thread of the present invention were nonmetallic and were not provided with a security function. Thereby, the original function of the security thread of the present invention is little  
20 recognized, and the security thread can therefore effectively be prevented from being illegally removed.

This cover member can be constituted as follows. For example, as  
25 shown in Fig. 1, two cover members 2, 3 alternately cover a periphery of a soft

magnetic fiber 1 in a double spiral shape without any gap. Moreover, as shown in Fig. 2, the soft magnetic fiber 1 is used as a core to dispose a core thread 4 on the periphery, both members are used as a core member 5, and two cover members 2, 3 alternately cover a periphery of the core member in the double spiral shape without any gap. Additionally, the cover members 2, 3 may be of one type and can of course be used in a single spiral shape, and numeral 9 denotes a thermal welding thread.

Moreover, as the cover member of the present invention, three or more gold or silver threads are used, gold or silver threads 6, 7, 8 are allowed to intersect one another obliquely, forward and backward or vertically in the periphery of the core member 5 by a constant method as shown in Fig. 3, and driven and tightened to form a braid structure in a preferable example. Numeral 9 denotes the thermal welding thread.

Furthermore, Figs. 4 to 6 show a use state of the security thread which embodies the present invention, and in Fig. 4 a security thread 10 is passed through an insertion hole of a tag 11 to form a ring shape, and an end of the thread is passed through a stopper member 12 to prevent the tread from falling off. Figs. 5 and 6 show an example in which the thread is used in a brand tag 13, and a stopper member 14 or 15 for passing the thread, preventing the thread from falling off, and fixing the thread is interposed midway. The stopper member 12, 14 or 15 can be distinguished by colors such as red, black and green, and the members can be classified by sizes, types, and the like.

It is necessary to manufacture the security thread of a first aspect of the present invention by constituting the core member by the soft magnetic

fiber, or the soft magnetic fiber and core thread, and subsequently covering the periphery of the core member with one or two or more cover members, and as a covering method of the cover member, a method of winding the cover member in a spiral shape to cover the periphery, or a method of using the 5 cover member and forming the braid structure to cover the periphery can be used to manufacture the thread. Moreover, in the manufacturing method of the second security thread of the present invention, it is necessary to cover peripheries of both the core member of the soft magnetic fiber or the soft magnetic fiber and core thread and the semi-hard magnetic material with the 10 cover member. Additionally, in the manufacturing method of the security thread of the present invention, a method of using the thermal welding thread together with the soft magnetic fiber as the core member, covering the core member with the cover member and subsequently performing a heat treatment at 80°C to 130°C to manufacture the security thread can be exemplified as a 15 particularly preferable manufacturing method example. However, when a natural fiber is used as a material of the cover member, it is natural to perform the heat treatment after the core member is covered with the cover member.

Additionally, the security thread of the present invention can easily be manufactured by using the aforementioned constituting elements and 20 applying the existing thread manufacturing technique.

Since the security thread of the present invention is constituted of the aforementioned elements, appearance of the thread appears is completely the same as that of a usual thread. Therefore, the thread is attached to a commodity or an equipment without any feeling of difference, and a theft 25 preventing function can easily be imparted. For example, a method of utilizing

flexibility of the soft magnetic fiber of the core member of the security thread of the present invention, and deforming and using the thread in a ring shape as shown in Fig. 4, and a use method shown in Figs. 5 and 6 are preferable as an application method of the security thread of the present invention because the  
5      thread can easily be attached to the commodity or the equipment together with the tag or the like.

Moreover, the security thread of the present invention can be placed in a pipe formed of polyethylene, polypropylene, biodegradable resin or another resin, and with such structure, the security thread can be used as a  
10     flexible rod-like member, and the thread can also be contained in a case box in which the commodity, and the like are contained.

In the security thread of the present invention, since the soft magnetic fiber provided with the superior magnetic characteristic is used in the core member, the security thread is easily magnetized in an alternating field  
15     generated in a magnetic theft preventing gate, and a detection signal is generated in a detection coil in the gate. Therefore, when the thread is used together with various magnetic theft preventing systems, the security function is sufficiently fulfilled.

20     <Examples>

The present invention will be described hereinafter by way of examples in more detail, but the present invention is not limited only to the examples.

Used as the soft magnetic fiber 1 was an amorphous metal fiber being high in general-purpose properties, indicating a high permeability of 5000 or more, being of a Co-Fe-Si-B base and having a linear diameter of 100 µm. Subsequently, the thermal welding thread 9 with a diameter of 200 d and the core thread 4 formed of a nylon bundle filament with a diameter of 200 d were used to form the core member together with the soft magnetic fiber. Subsequently, two polyethylene terephthalate threads with each diameter of 1000 d were used in the cover member to cover the periphery of the core member in the spiral shape, and the security thread of the structure of Fig. 2 was manufactured. Additionally, in this forming process, after the periphery was covered with the cover member, the thread was subjected to a drying heat treatment at 120°C for 30 minutes.

15                   **Example 2 (No. 2)**

As the cover member, three nylon threads with each diameter of 1260 d were used to cover the periphery of the core member used in Example 1 in the spiral shape, and the drying heat treatment was performed to form the security thread.

20                   **Example 3 (No. 3)**

The peripheries of the core member used in Example 1, and core member excluding the core thread 4 of the nylon bundle filament with a diameter of 200 d were covered with two nylon threads with each diameter of 1260 d as the cover member in the spiral shape, and the drying heat treatment was performed to form the security thread.

Example 4 (No. 4)

The periphery of the core member used in Example 1 was covered with three nylon threads with each diameter of 630 d as the cover member in the spiral shape, and the drying heat treatment was performed to form the security thread.

Example 5 (gold thread)

A gold thread to which a colored cellophane material was thermally welded to an aluminum foil was used in the cover member to cover the peripheries of the core member used in Example 1 and spun rayon of a bundle or twist thread in a Kara-8-thread (Kara-hachi-da) braid shape, and the drying heat treatment was performed to form the security thread of Fig. 3.

Subsequently, the respective formed security threads were used to form a ring with a cut length of 150 mm and a diameter of 40 mm, and a ring with a cut length of 100 mm and a diameter of 25 mm. Subsequently, a magnetic security system of Dialock Co., Ltd. of Canada (commodity name: EM-1300 system) was used to examine the security function. Here in the system, a gate width was set to 900 mm for the ring with a diameter of 40 mm, and the gate width was set to 900 mm or 800 mm for the ring with a diameter of 25 mm. Moreover, for a sensitive level, under voltage adjustment on conditions of red LED 1.6 V, green LED 1.25 V and red LED 1.6 V, green LED 1.45 V, presence/absence of detection was examined. Additionally, with the 40 mm ring, the presence/absence of detection was examined while the state was unchanged. However, the 25 mm ring is considered to be used for small

things such as a ring and eyeglasses. Therefore, while the ring was placed in a wallet, a coin purse, or a bag, the presence/absence of detection was examined.

Examination results are shown in the following Table 1.

Table 1 Detection Experiment of Security Thread

Sample No.	40Φ ring		25Φ ring			
Voltage adjustment	Red 1.6V/green 1.25V	Red 1.6V/green 1.45V	Red 1.6V/green 1.25V		Red 1.6V/green 1.45V	Red 1.49V/green 1.25V
Gate width	900 mm	900 mm	900 mm	800 mm	800 mm	800 mm
No.1 shape	fourthly good 40 cm from antenna <input type="radio"/> ∞	fourthly good <input type="radio"/> <input type="radio"/> ∞	little more than 30 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag
No. 2 shape	secondly good 45 cm from antenna <input type="radio"/> ∞	secondly all good <input type="radio"/> <input type="radio"/> ∞	40 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag
No. 3 shape	firstly good 45 cm from antenna <input type="radio"/> ∞	firstly all good <input type="radio"/> <input type="radio"/> ∞	little more than 40 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag
No. 4 shape	thirdly good little more than 40 cm from antenna <input type="radio"/> ∞	thirdly good <input type="radio"/> <input type="radio"/> ∞	little more than 30 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag
Tagged No.2 No. 3	good	good in coin purse, wallet and bag	little more than 40 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag
Gold thread Kara-8-thread	Good <input type="radio"/> ∞	all good <input type="radio"/> <input type="radio"/> ∞	little more than 40 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag
Kara-8-thread Tagged	good	good in coin purse, wallet and bag	little more than 40 cm from antenna	all good <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag <input type="radio"/> <input type="radio"/>	good in coin purse, wallet and bag

No. 1: PET 1000/1×2: covering: drying heat treatment

No. 2: NY 1260/1×3: covering: drying heat treatment

No. 3: NY 1260/1×2: covering: drying heat treatment

No. 4: NY 630/1×3: covering: drying heat treatment

Kara-8-thread (gold thread):

aluminum foil/cellophane coloring/welding

5

As a result, it has been confirmed as shown in Table 1 that for each of the security threads of No.1 to No.4 and gold thread according to the present invention, an area sensed in a gate is broad, and that the security thread has a sufficient performance as a mark for security. Moreover, it has been found that when the sensing performance is ranked on respective experiment conditions based on an extent of the area sensed by the system, the 25 mm ring satisfactorily functions at all sensing levels. On the other hand, it has been confirmed as shown in Table 1 that the 40 mm ring is satisfactory in order of No. 3 as best, No.2 as second, No. 4 as third, and No.1 as fourth.

10

Additionally, the aforementioned result was obtained with a circular shape (ring), but it has also been confirmed that there is no particular problem in sensing characteristic even when the security threads of No. 1 to No. 4 and gold thread of the present invention with each cut length of 150 mm are deformed to an elliptical shape from the ring shape, or even when the security thread is once twisted and deformed into an 8-shape.

15

20

#### Example 6

The same amorphous metal fiber 1 and core thread 4 of the nylon bundle filament as those of Example 1 were used to form the core member, further as shown in Fig. 7, the Fe-Co-V fine wire 10 (with a coercive force of

25

00763520-022301

120 oersteds) of the semi-hard magnetic material with a diameter of 80 µm in a demagnetized state was used in a deactivating member, the periphery was covered with the cover members 2, 3 of two polyethylene terephthalate threads with each diameter of 1000 d in the spiral shape, and the security thread was manufactured. Subsequently, the security function was examined similarly as Example 1. As a result, it has been confirmed that the security thread is provided with a sufficiently satisfactory security function.

Subsequently, it was checked in the following method whether or not the fine wire 10 sufficiently fulfilled its function as the deactivating member.

That is to say, since detection of the security thread by the security system is requested to be disabled on condition of payment for a commodity price, a permanent magnet is disposed in the vicinity of the security thread of Example 6, and the semi-hard magnetic material disposed inside is magnetized and placed in a deactivated state. As a result, it has been found that the security thread of the deactivated state has no area to be sensed in the system. That is to say, it has been confirmed that the security thread provided with the semi-hard magnetic material is sufficiently useful as a product which can be deactivated.

20                  Example 7

The security thread of the structure of Fig. 2 was manufactured similarly as Example 1, except that a Co-Fe-Si-B based amorphous metal ribbon having a sectional structure with a width of 0.75 mm and thickness of 0.03 mm and indicating a high permeability of 5000 or more was used as the soft magnetic fiber 1.

Subsequently, the formed security thread was cut to obtain a length of 150 mm and a ring with a diameter of 40 mm was formed. Subsequently, similarly as Example 1, the magnetic security system was used to examine the security function.

As a result, it has been found that the ring product of Example 7 has a large area to be sensed in the system gate, and has a detecting function comparable to that of No. 3 of Example 3.

That is to say, it has been confirmed that even when the amorphous metal ribbon is used as the soft magnetic fiber, the sufficiently useful security thread can be obtained.

#### Example 8

The security thread of the structure of Fig. 2 was manufactured similarly as Example 6, except that the Co-Fe-Si-B based amorphous metal ribbon having a sectional structure with a width of 0.75 mm and thickness of 0.03 mm and indicating a high permeability of 5000 or more was used as the soft magnetic fiber 1.

Subsequently, the formed security thread was cut to obtain a length of 150 mm and the ring with a diameter of 40 mm was formed. Subsequently, similarly as Example 1, the magnetic security system was used to examine the security function. As a result, it has been found that the ring product of Example 8 has a large area sensed in the system gate, and has a sufficient detecting function.

Furthermore, the permanent magnet was disposed in the vicinity of the security thread, and the semi-hard magnetic material disposed inside was

magnetized and placed in the deactivated state. Subsequently, when the detection performance of the security thread of the deactivated state was confirmed in the system, it was found that the security thread was not sensed in any area. That is to say, it has been confirmed that the security thread provided with the semi-hard magnetic material is sufficiently useful as the product which can be deactivated.

5                    Possibility of Industrial Utilization

10                  A security thread and manufacturing method of the security thread according to the present invention are constituted as described above. Therefore, since appearance of the security thread cannot be distinguished as a security product, there is no possibility that the security thread is separated or cut away. Even when the security thread is removed, it maintains its function in a wallet or a bag, and can be sensed so that a satisfactory security state can be achieved. Moreover, the security thread can advantageously 15 easily be attached even to a small thing or a box material to which it has been difficult to attach the security thread, and according to the present invention there is provided a practically useful security product.

## CLAIMS

1. A security thread comprising:

a core member comprising a soft magnetic fiber, or the soft magnetic fiber and a core thread; and

5 a cover member comprising a nonmetal material to cover said core member.

2. A security thread comprising:

a core member comprising a soft magnetic fiber, or the soft magnetic fiber and a core thread;

10 a member disposed in the vicinity of said core member and composed of a semi-hard magnetic material; and

a cover member comprising a nonmetal material to cover said core member and said member comprising the semi-hard magnetic material.

15

3. A security thread comprising:

a core member comprising a soft magnetic fiber, or the soft magnetic fiber and a core thread;

20 a thermal welding thread disposed in the vicinity of said core member; and

a cover member comprising a nonmetal material to cover said core member and said thermal welding thread.

4. The security thread according to any one of claims 1 to 3

09763315 - 022304

wherein said soft magnetic fiber comprises an amorphous metal ribbon.

- 5        5. A manufacturing method of a security thread, comprising a step  
of covering a periphery of a core member comprising a soft magnetic fiber or  
the soft magnetic fiber and a core thread with a cover member comprising a  
nonmetal material.
- 10      6. A manufacturing method of a security thread, comprising a step  
of covering peripheries of a core member comprising a soft magnetic fiber or  
the soft magnetic fiber and a core thread and a member disposed in the  
vicinity of said core member and composed of a semi-hard magnetic material  
with a cover member comprising a nonmetal material.
- 15      7. (amended) A manufacturing method of a security thread,  
comprising a step of covering peripheries of a core member comprising a soft  
magnetic fiber or the soft magnetic fiber and a core thread and a thermal  
welding thread disposed in the vicinity of said core member with a cover  
member comprising a nonmetal material.

## ABSTRACT

According to the present invention, there is provided a security thread whose existence is not clarified, which is prevented beforehand from being removed, which can be attached even to a form of a commodity heretofore regarded as difficult, and whose use purpose range is enlarged, and the security thread can be constituted by a core member comprising a soft magnetic fiber (1) or the soft magnetic fiber and a core thread (4), and a cover member (2, 3) comprising a nonmetal material to cover the core member, 5 constituted by covering the core member comprising the soft magnetic fiber or the soft magnetic fiber and core thread and a semi-hard magnetic material (10) with the cover member, or constituted by covering the soft magnetic fiber or the core member comprising the soft magnetic fiber and a thermal welding thread (9) with the cover member.

10

15

09763515 · 022301

FIG. 1

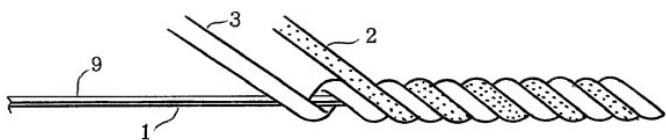
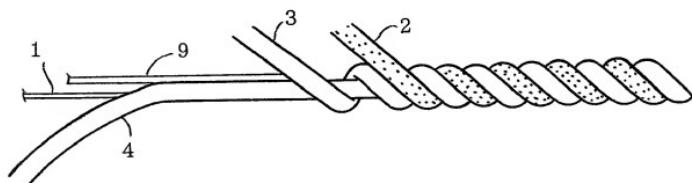


FIG. 2



09763515-022301

2 / 5

FIG. 3

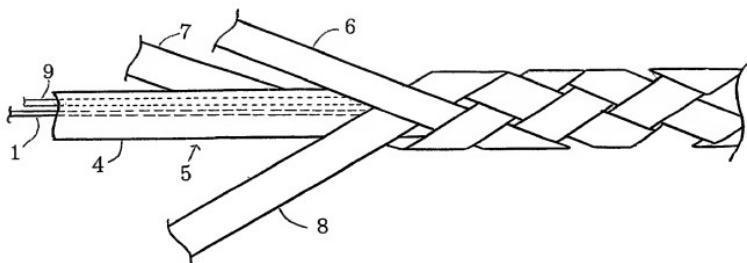


FIG. 4

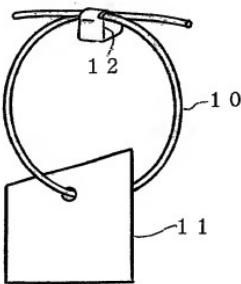
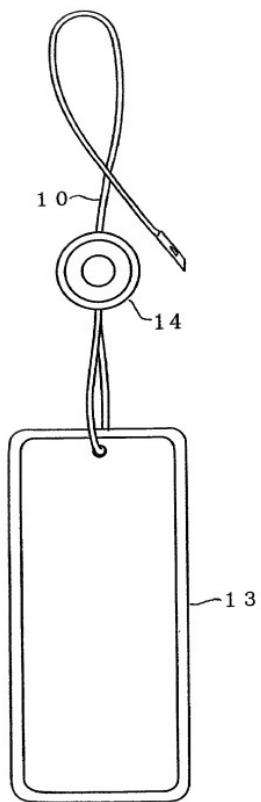
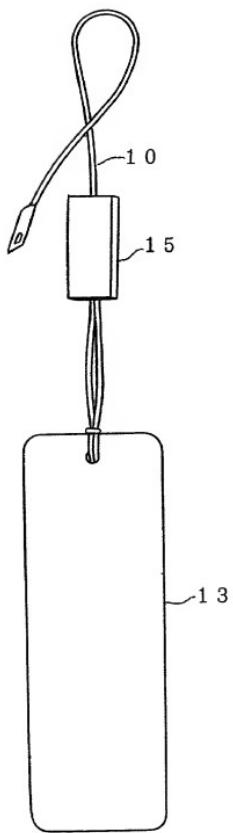


FIG. 5



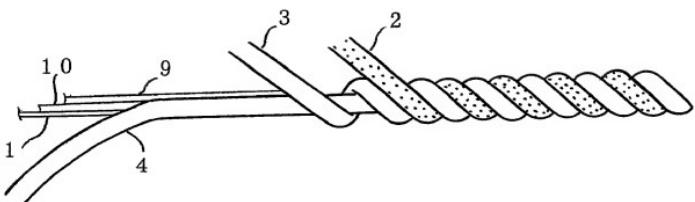
4 / 5

F I G . 6



5 / 5

FIG. 7



09763515-022301

## DECLARATION FOR PATENT APPLICATION

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

### SECURITY THREAD AND MANUFACTURING METHOD THEREOF

the specification of which: (check one)

July 10, 2000

[ ] is attached hereto. [x] was filed on \_\_\_\_\_, as United States Patent Application Serial No. or PCT International Application Number PCT/JP00/04584  
and was amended on DEC. 14, 2000, if applicable.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with 37 CFR § 1.56(a).

Prior Foreign Application(s): I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate listed below, or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>11-195919</u>	<u>Japan</u>	<u>9, July, 1999</u>	Priority Claimed <input checked="" type="checkbox"/> [ ]
(Application No.)	(Country)	(Day/Month/Year Filed)	Yes No <input type="checkbox"/> [ ]
(Application No.)	(Country)	(Day/Month/Year Filed)	Yes No <input type="checkbox"/> [ ]
(Application No.)	(Country)	(Day/Month/Year Filed)	Yes No <input type="checkbox"/> [ ]

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

Application No.	Filing Date
_____	_____

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by 35 U.S.C. § 112, first paragraph, I acknowledge the duty to disclose material information as defined in 37 CFR § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(U.S. Application Serial No.)	(U.S. Filing Date)	(Status—patented, pending, abandoned)
(U.S. Application Serial No.)	(U.S. Filing Date)	(Status—patented, pending, abandoned)

 I hereby appoint Elliott L. Pollock, Registration No. 16,906; George Vande Sande, Registration No. 17,276; Burton A. Amernick, Registration No. 24,852; Stanley E. Green, Registration No. 24,351; Richard Wiener, Registration No. 18,741; Townsend M. Belsler, Jr., Registration No. 22,956; Morris Liss, Registration No. 24,510; Martin Abramson, Registration No. 25,787; George R. Petit, Registration No. 27,369; Elzbieta Clopecka, Registration No. 32,767; Eric J. Franklin, Registration No. 37,134; and Jeffri A. Kaminski, Reg. No. 42,509 my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Send Correspondence and Direct Telephone Calls to:  
Morris Liss  
(202) 331-7111

Morris Liss  
CONNOLLY BOVE LODGE & HUTCH LLP  
P.O. Box 19688  
Washington, D.C. 20036-3425 U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor:

Tetsuro Wada

Inventor's Signature Tetsuro Wada Date February 5, 2001  
Residence Address Yokohama-shi, Kanagawa Japan   
Citizenship Japanese  
Post Office Address 208, Nishitobecho 2-chome, Nishi-ku, Yokohama-shi, Kanagawa 220-0041  
All See next page for additional inventors Japan

## DECLARATION FOR PATENT APPLICATION

Page Two

Full name of second joint inventor (if any): Katsumi Matsumura  
Inventor's Signature Katsumi Matsumura Date February 5, 2001  
Residence Address Hino-shi, Tokyo Japan JPX  
Citizenship Japanese  
Post Office Address 1564-35, Minamidaira Hino-shi, Tokyo 191-0041 Japan

Full name of third joint inventor (if any): \_\_\_\_\_ Date \_\_\_\_\_  
Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Address \_\_\_\_\_  
Citizenship \_\_\_\_\_  
Post Office Address \_\_\_\_\_

Full name of fourth joint inventor (if any): \_\_\_\_\_ Date \_\_\_\_\_  
Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Address \_\_\_\_\_  
Citizenship \_\_\_\_\_  
Post Office Address \_\_\_\_\_

Full name of fifth joint inventor (if any): \_\_\_\_\_ Date \_\_\_\_\_  
Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Address \_\_\_\_\_  
Citizenship \_\_\_\_\_  
Post Office Address \_\_\_\_\_

Full name of sixth joint inventor (if any): \_\_\_\_\_ Date \_\_\_\_\_  
Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Address \_\_\_\_\_  
Citizenship \_\_\_\_\_  
Post Office Address \_\_\_\_\_

Full name of seventh joint inventor (if any): \_\_\_\_\_ Date \_\_\_\_\_  
Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Address \_\_\_\_\_  
Citizenship \_\_\_\_\_  
Post Office Address \_\_\_\_\_

Full name of eighth joint inventor (if any): \_\_\_\_\_ Date \_\_\_\_\_  
Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Address \_\_\_\_\_  
Citizenship \_\_\_\_\_  
Post Office Address \_\_\_\_\_